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THE DYNAMICS OF KNOWLEDGE IN PORTUGAL – THE ROLE PLAYED BY PUBLIC INSTITUTIONS[1]

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THE DYNAMICS OF KNOWLEDGE IN PORTUGAL – THE ROLE PLAYED BY PUBLIC INSTITUTIONS[2]

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Abstract

The process of knowledge development in Portugal has progressed at very different speeds in function of the economic outlook and the alternation of political power. The main driving and regulatory forces have been greatly conditioned by domestic and international restrictions. In this framework, public institutions during the previous social-democratic Government and above all the Portuguese Agency for Science and Technology, have greatly contributed to the backlash in the previous favourable evolution which had been characterizing the evolution of knowledge development since the first decade of 2000.This has led to instability and the discontinuity of the framework of public policy, which has been faced with two kinds of fundamental problems: a series of structural blocks which have proved difficult to eradicate, and the lack of a true knowledge strategy.

Key Words: knowledge development, Portugal, political alternation, public institutions, regulation.

JEL Classification: O32, O33, O38.

1. Introduction

When considering the OECD zone, we can observe that Portugal ranges under both OECD and EU 28 averages in what has to do with investment in knowledge, although scoring better than some Southern European countries. This result is the outcome of an evolution severely marked by stagnation during the 40 years of dictatorship, then followed by an important upsurge after the democratic revolution in 1974 and, especially, during the first decade of this millennium. The arrival of the late economic crisis coincided in Portugal with the ruling of a social-democratic right wing Government, both events leading to a severe backlash in the progress of knowledge development in the country. The inconsistency among public policies related to education, science and technology, as well as the inefficiency of the process of knowledge regulation in which the divide between private and social goals became frequently very hazy, are to be considered as the leading determinants of that backlash. In either periods and evolution paths public institutions did play a decisive role.

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2. General Characterization

Let us now trace the main evolutionary trend displayed by the process of the development of knowledge in Portugal.
Among the main indicators we have to stress the effort displayed in R&D by the economy as a whole, as depicted in Figure 1:

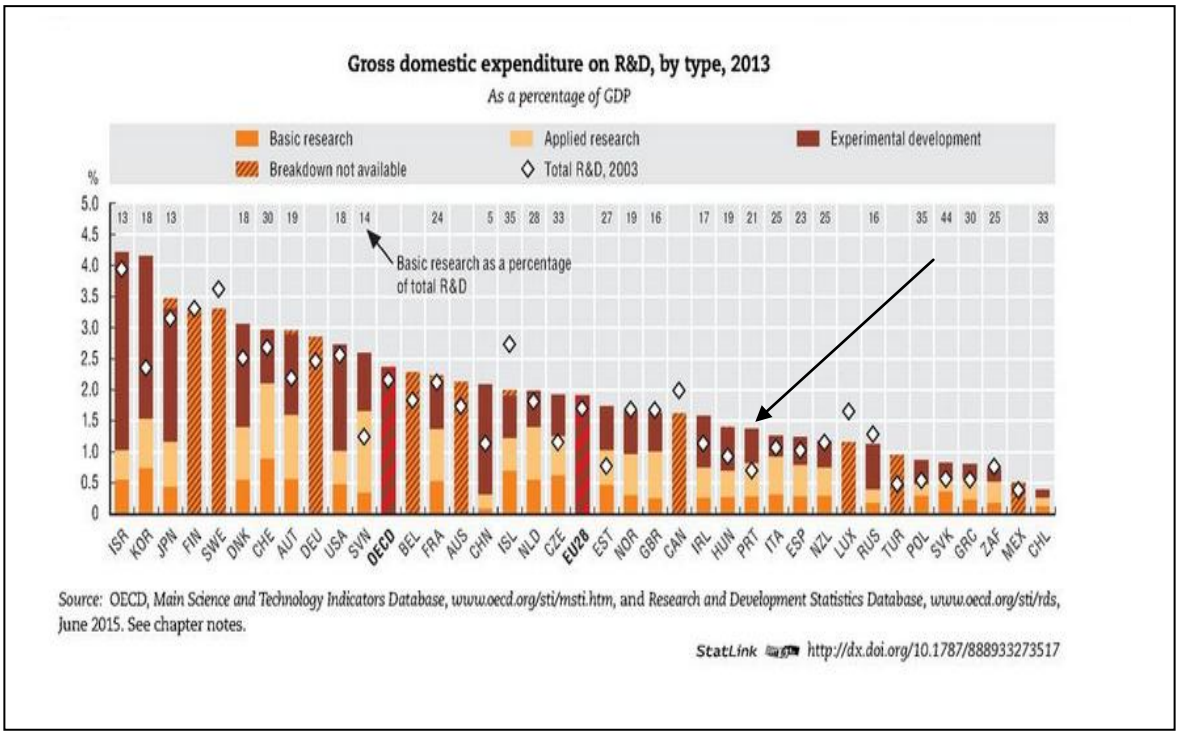

Figure 1: Gross Domestic Expenditure on R&D, by type, 2013
Source: OECD (2015)

We can observe that the national effort related to research and development ranges under both OECD and EU28 averages, although scoring better than the other southern Europe countries.

The ebb and flow of the knowledge process in Portugal has been thoroughly analysed, as have the determinants of its development[3]. Among these, change of government deserves highlighting, and especially political regimes: four decades of dictatorship, which led to the stagnation of the progress of the qualifications of the Portuguese, came to an end in 1974, to be followed by a democratic regime that brought about the modern development of the policies of education, science, technology, and innovation, or in other words, the impetus for the modern development of knowledge process in Portugal. The periods of 1995 to 2002, and especially 2005 to 2010/2011, during which the physicist Mariano Gago was Minister for Science, Technology and Higher Education, experienced particularly significant growth in key domains for the progress of this area, of which the following indicators are an example:

[3] See, for instance, Chagas Lopes, M. (2015).

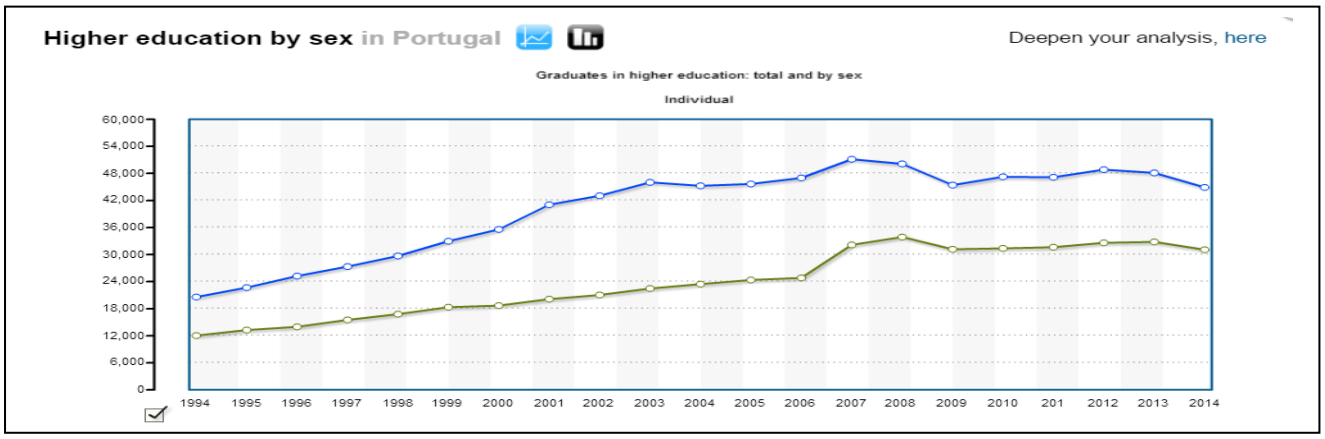

Figure 2: The Evolution of the number of Higher Education graduates in Portugal, 1994-2014, thousands of people, by sex

Source: PORDATA DATABASE (www.pordata.pt).

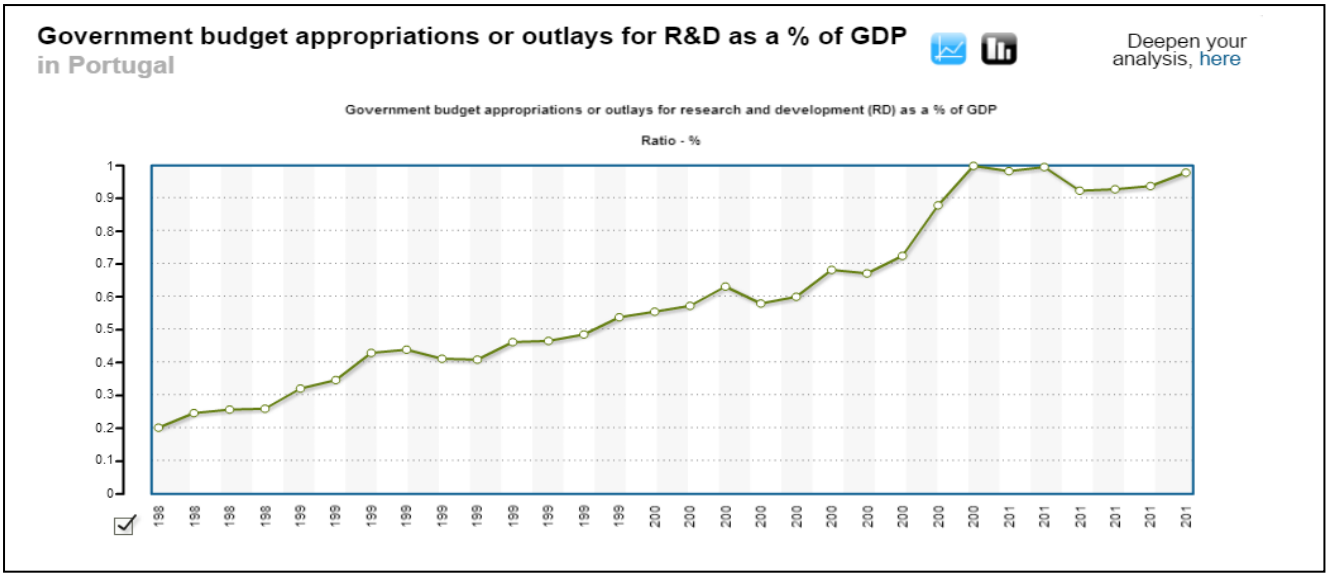

Figure 3: Government budget appropriations or outlays for R&D as a percentage of GDP

Source: PORDATA DATABASE (www.pordata.pt).

A similar behaviour was observed for the indicator for the number of full-time equivalent (FTE) researchers per thousand active people: its value more than doubled between 2005 and 2011, increasing 4.4 times for Social Sciences and Humanities, 2.5 times for Medical and Health Sciences, and 2.2 times for Pure Sciences and Natural Sciences.

The year 2010 was a turning point, however. On the one hand, the accumulation of the effects of the 2008 economic crisis meant that scarce public resources were available to continue to maintain a similar pace to that of the previous period. On the other hand, the institutions once again played a role, namely: the European Central Bank, the European Commission, and the International Monetary Fund, which imposed very strong restrictive measures, especially for the Southern Europe countries, in order to contain public deficits; but also those Portuguese public authorities responsible for the policies of education, science, technology, and innovation behaved even more restrictively than the Troika had

imposed, adding the hyper-bureaucracy of the public agency for Science and Technology (FCT) to the drastic cuts in funding.

With regards to education, State expenditure for this sector increased by 38% (34% per capita) between 2000 and 2010, but fell by about 26 percentage points (23 p.p. per capita) between 2010 and 2014. In the years 2011 and 2012 alone, the registered variation per capita fell by about 63 p.p. and 116 percentage points, respectively, resulting in the value of this indicator returning to 2003 levels in 2014 – which is the last year of available data (PORDATA DATABASE 2016).

In other areas of knowledge generation, the great turning point in public policy occurred in 2010/2011. It is true that the effects of the economic and social crisis had been felt since 2007/2008, but the truth is that the reduction in the share of the State budget for R & D was increasingly more severe up until 2010, as was total expenditure by universities and non-profit institutions (NPIs) in R & D, the corresponding decrease of these expenses by companies and the State having already begun in 2009.

From 2011 onwards, practically all the indicators for R & D deteriorated: public budget funding fell by more than 11% between 2011 and 2012, recovering only modestly since then. The total expenditure on R & D activities in companies fell by an average of 4.7% per year since 2010; and this also decreased by about 38% in the State sector in 2011 and 2012, and by about 17.5% in Universities, and 32% in NPIs during the same biennium. In 2012 and 2013, the employment of researchers declined cumulatively by more than 12%, whilst FCT scholarships for doctorates was drastically reduced: by 23.2% less in total in 2012, which is the last year of available data; and by 47% less for Humanities, 42.5% less for Social Sciences, and 30.3% less for all branches of Pure Sciences, Natural Sciences, and Engineering and Technology.

For a better illustration of the Portuguese situation after 2010, the following graphs compare this with that of some other Community EEMM for two of the most significant indicators - total spending on R & D, and the number of people employed in R & D per 1,000 inhabitants in 2013:

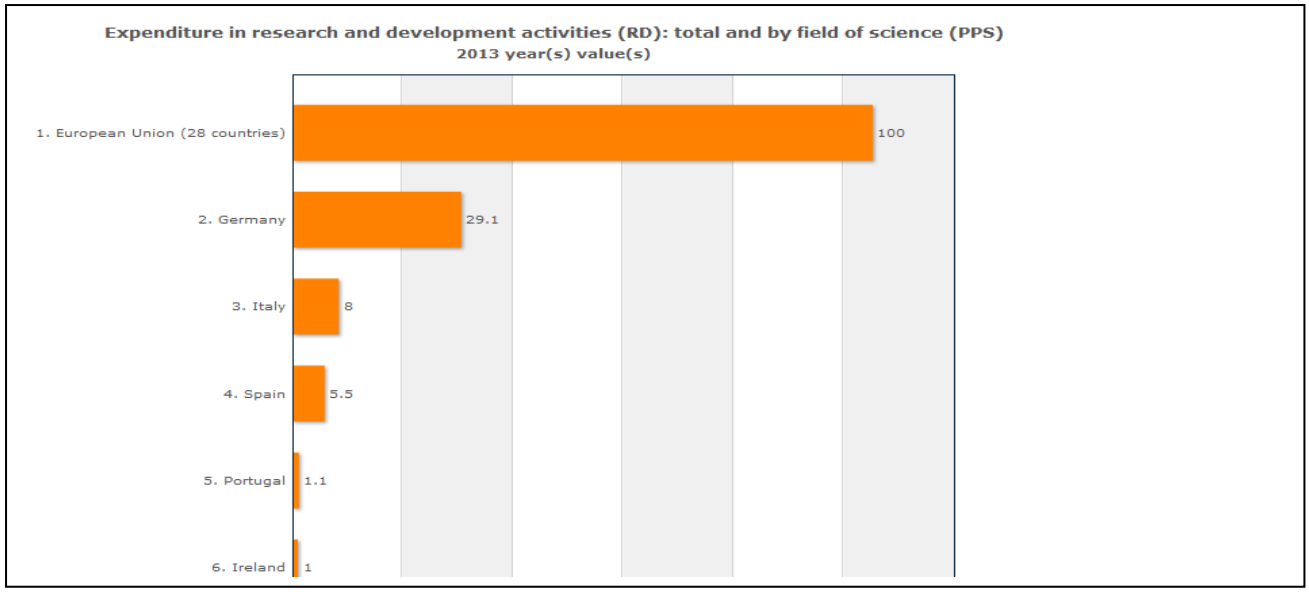

Figure 4: Expenditure in R&D activities for some EU countries (pps), 2013

Source: PORDATA DATABASE (www.pordata.pt).

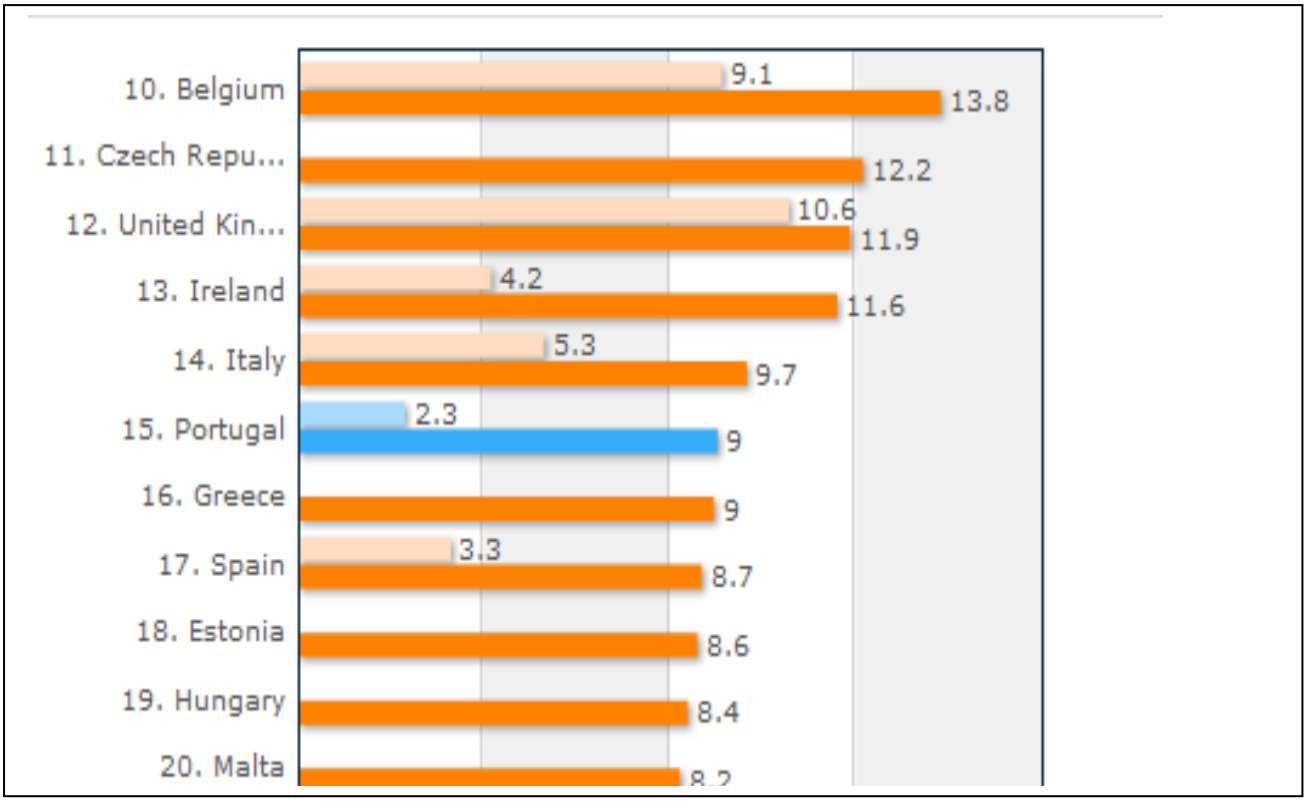

Figure 5: Total employees in R&D per thousand active people (%), 1986 – 2014

Source: PORDATA DATABASE (www.pordata.pt).

On a positive note, which attests the potential of the Portuguese population for the development of R & D and knowledge: despite all the vicissitudes resulting from the reversal of public policy priorities, the number of doctorates and scientific publications per 100,000 inhabitants has increased continually since 2010, although these facts reflect the utilisation of resources that had been allocated previously. This increase was 10% in the first case, and 52% in the second, which also demonstrates the resilience of doctoral students and researchers who have been required to exercise their activity in a context of extreme job insecurity (PORDATA DATABASE 2016).

3. Theoretical Framework: Knowledge Economics and Ideological Conditions

It is important that we now move on to review, albeit briefly, some of the basic elements of the Economics of Knowledge.

Ever since the endogenous growth theorists, such as Barro (1988) and Romer (1994), important research has been carried out regarding the contributions of knowledge (firstly, education and skills) for economic development. From the "unknown residue", or "measure of our ignorance" of the initial models, which usually took the form of the Cobb-Douglas function or its developments, several phases of research emanated, perhaps one of the most important being the approach of Hanushek & Woessmann (2012): contrary to that which was previously accepted, the contribution of the human factor in development does not depend on the number of years of schooling or training, but rather on the quality of learning, combined with the way that knowledge has been assimilated by the individual over the years. This contribution thus also depends on advanced studies obtained from schools and universities. Thus, one of the fundamental laws of Economics of Knowledge is revealed: in general, the introduction of new knowledge and the development of existing knowledge in certain sectors of activity and/or certain scientific fields gives rise to important spillover effects which have an impact on other areas of activity, and on other areas of knowledge.

Crucial for this is that such cross-fertilization is properly supported by policies for education, R & D, and innovation.

The finding of these spillover effects should in itself be sufficient to establish, on the one hand, the principle that only a global view of the knowledge process allows one to take into account all of the knock-on effects and their utilisation to further sustainable economic development. On the other hand, it was equally clear why it was becoming more attractive to further the knowledge process throughout private business or in small protected groups: thus it could be possible to both obtain and maintain considerable profit margins, and also control, either directly or indirectly, other fields of activity or knowledge.
These findings emerged at the time of the development of the Third Industrial Revolution, and they were greatly reinforced with the advent of information and communication technologies (ICT), which came to eradicate, once and for all, the assumptions that knowledge was a public good[4], even calling into question its use as a social good, unless there was a process for regulating knowledge that would effectively make it available to the population as a whole.

For technical and agency reasons, such a global vision, in our view, could mean that the social regulation of the knowledge process is only carried out by the State (Government), as expounded later on below.

However, the practical manifestation of this regulation is unlikely to be uniform, but rather will depend on the ideology that supports the government. Thus, for example, during the period between 2005 and 2010/11, the underlying principle for public policies on education, R & D and innovation in Portugal was that these constituted investments in the service of economic and social development, and the well-being of people in general. Already, during the period of 2011-2015, under the coalition government of the Social Democratic Party and the Christian Democrats, together with the imposition of austerity measures by the Troika, knowledge policies (and others ...) were totally conditioned by the priority to contain the deficit of the Public Accounts, whereby the costs of education, R & D, S & T and Innovation were considered as mere costs, and, as such, were drastically cut, as described in Section 1. Only a few of the major economic groups were able to maintain, in part, their research and development activities, which however corresponded to the need to implement new forms of production and business organisation processes, as well as a very modest innovation in new products.

The influence of successive ideologies regarding the process of knowledge has been well described by Apple (2014), among other authors, and the same influence also manifest itself in the institutional intervention in R & D. The Portuguese State agency for Science and Technology, the FCT, which is responsible for the evaluation of university research centres and the approval or rejection of scientific projects, was not immune to this successive evolution. Many situations found themselves constrained by ideological change, whether they were scientific projects solely involving higher education and "pure" scientific research, or if they involved the triad of University - Government - Businesses, the so called "triple helix" in the words of Etzkowitz & Leydesdorff (1995), and more recently, Leydesdorff (2013). One of the most important consequences was a certain hierarchisation of scientific areas, which has been especially felt since 2012, with projects of Engineering, Natural Sciences and Medical Sciences and Health having a much higher probability of approval and better funding than the "critical areas" of Social and Human Sciences (FCT 2016). However, with the advent of the current executive of the FCT in November 2015, new perspectives and

[4] According to the definition of a public good, this should simultaneously respect two principles: i) that of non-rivalry, by which individual access to this good (in this case knowledge) should not implicate the limitation of its access to others; ii) and that of non-exclusion, by which nobody should be excluded from the benefits of knowledge.

conceptions of the knowledge process seem to be being implemented, as will be subsequently examined.

4. Structural Issues and Public Policy: Innovation and Regulation

The importance of the theoretical and ideological aspects would not be so significant if these aspects did not contribute to exacerbating some of the structural problems regarding the process of the development of knowledge that have proven difficult to eradicate. One such problem is the persistent imbalances of the structure for qualifications in the Portuguese labour market. This aspect has been referred to several times, and we have called it the 'chimney effect', or the 'piston effect':

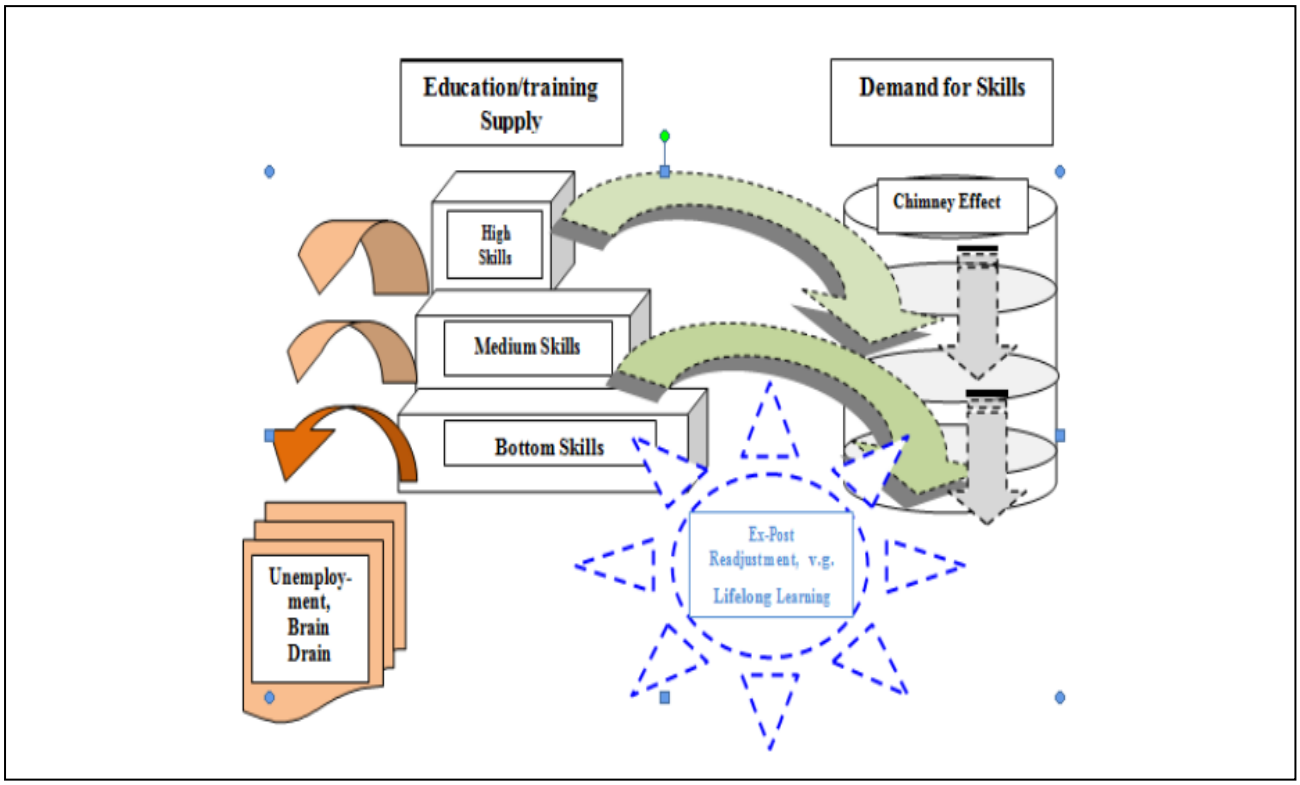

Figure 6: The Underutilization of Skills and the 'Chimney Effect' in the Portuguese Labour Market

Source: Kovács & Chagas Lopes (2010), Chagas Lopes (2011, 2014).

Looking at the right side of the Figure above, it appears that the demand for skills systematically occurs at lower levels of qualification than the possessed by the supply of qualified leavers from schools and other training institutions. This is thus pushed down to the base, or to unemployment and emigration, which is the 'piston effect' of less-skilled workers.

This situation of structural disqualification worsened sharply as a result of the 2008 economic crisis. In addition to the 'piston effect', we are also now seeing a growing shortage of jobs for graduates from higher education and advanced studies. Still according to the above Figure, this translates to an increased flow of the highly skilled direct to the brain drain and unemployment. However, public initiatives have been launched to strengthen the entrepreneurship of these high skilled workers, which, although showing positive results, are still highly insufficient for their absorption by the business world.

Although public innovation policy cannot be blamed for all situations, its failure has greatly contributed to strengthening the other side of the coin of this structural problem: the inability of Portuguese companies to absorb the most qualified, which is so needed to bring about a leap in productivity and the competitiveness of Portuguese businesses. Historically, this situation has originated from a multiplicity of interconnected factors: the lack of qualified managers and the persistence of family-run management models, the inefficiency of the scale of business, and the too-late conversion of business activity, which leads to the loss of markets through a lack of competitiveness, among other determinants.

In this regard, it is interesting to note that, according to the Community Innovation Survey, only 54.5% of Portuguese companies carried out innovation during the period from 2010 to 2012, which is the latest period for which data is available; and of these, only 41.2% was dedicated to the development of products or processes, which in this case, includes taking up again previously-uncompleted innovation. The strategies considered to be the most important by Portuguese companies that invest in innovation are: firstly, the reduction of operational costs or the purchase of materials (66.9% and 61.3%, respectively); the introduction of new or improved goods and services (40.8%), and only, for about 30% of them, the development of new markets, both inside and outside the European Union (EUROSTAT/DGEEC, 2014).

The situation of Portugal in relation to the context of the European Union becomes clear when one considers the following Figure:

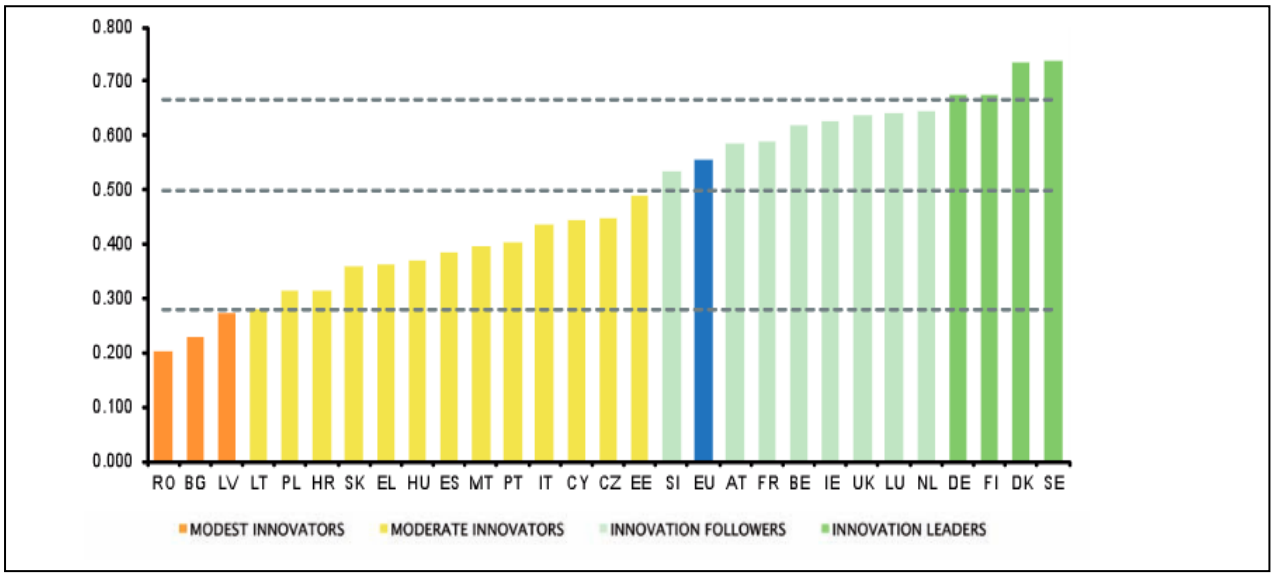

Figure 7: EU Member States' Innovation Performance

Source: EU (2015).

It can be seen that Portugal is part of the group of moderate innovators, situated below the average EU performance. This reflects a structural problem related to the fact that Portuguese innovation is almost entirely restricted to medium and large companies; which is highly significant in an economy which is 80% comprised of small and medium-sized companies.

For all these reasons, intervention by the public authorities/the Government is considered to be essential as the regulator of the knowledge process in Portugal. Indeed, it is only they that possess the indispensable and coordinated global overview of performance in the fields of education, research and development, and innovation. No other entity has the capacity to achieve the requirements of the dynamic path of the knowledge process, which includes its

production at various levels of qualification, its development through research and advanced studies, and also, providing the necessary conditions for the assimilation of knowledge by the business community.

On the other hand, only the Government can interpret the desired global social objectives that can be obtained through an extensive process of social consensus. It falls to the Government therefore to regulate the knowledge process, in order to maximize these objectives and to avoid the following: the appropriation of the fruits of knowledge by private or restricted groups only; profiting from knowledge by private holders only; insufficient dissemination and endogeneisation of knowledge within the economy; and the limited appropriation of the process and results of knowledge by society as a whole.

If it is true that only the Government can play such a role in regulation, then it is also true that, in practice, such regulatory intervention is often very conditioned - firstly by the ideological demands of the electoral base that supports and sustains the Government, as we have discussed above, and also by restrictions imposed by international commitments, which, in the Portuguese case are related to the European Union and its regulations.

However, often such an overall vision of the knowledge process is difficult to bring about, as it is extremely demanding in terms of rigor, the effective coordination between the various institutions, governing entities, and effective decision making. In theory, the regulation of the knowledge process can be summarised throughout the model I am proposing in the next Figure:

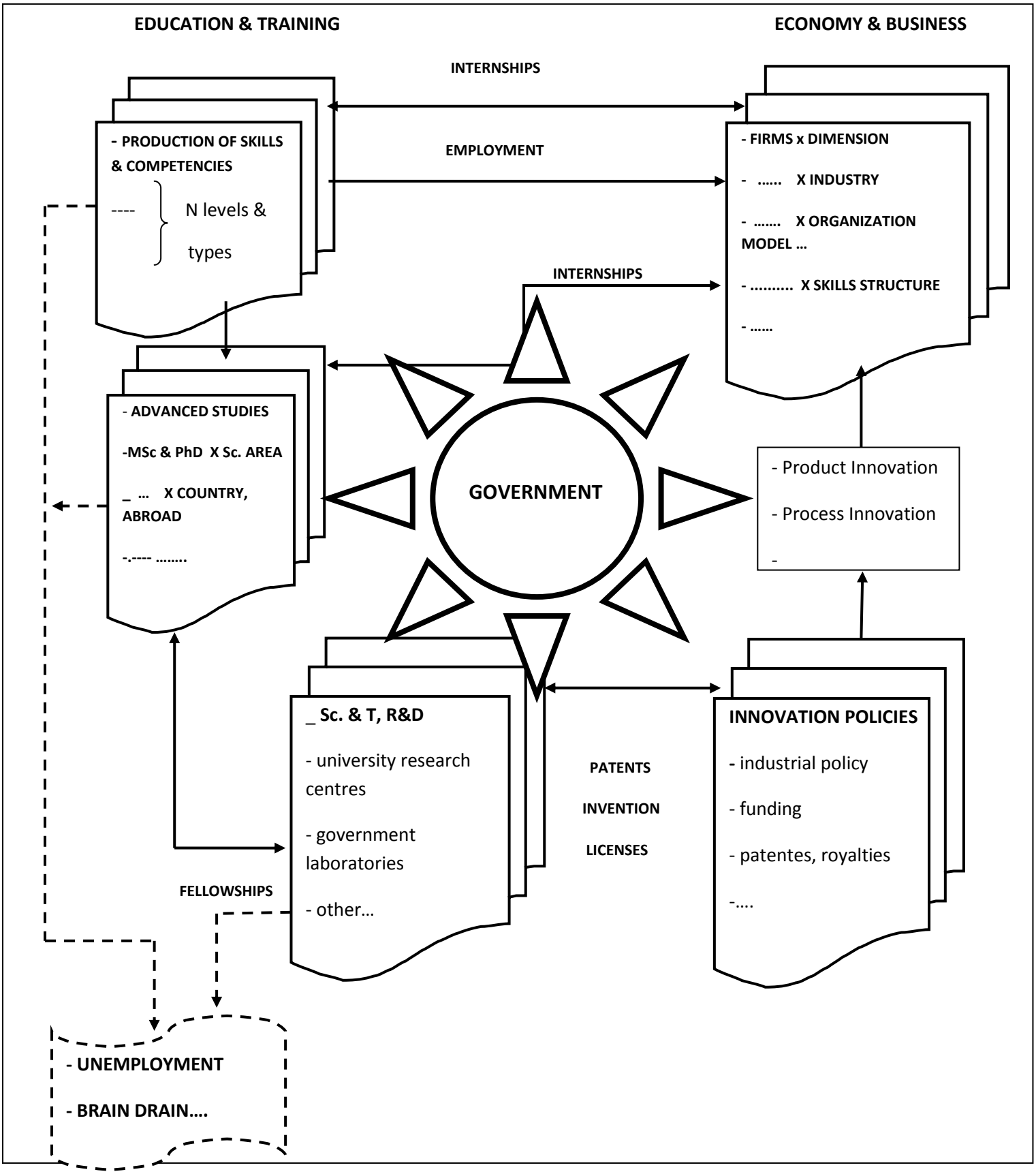

Figure 8: The global regulation of the knowledge process.

4. Towards a Knowledge Strategy…

The above Figure clearly shows the complexity of the process of regulating the knowledge system. On the one hand, the links often fail, mainly on account of the structural characteristic of the Portuguese public administration: each governing entity - ministry, state secretariat, or even directorate-general for the coordination of each of the above stated areas is usually reticent to share information, for fear of losing their relative power. This is in evidence, for example, in the (difficult) relationship that has been established between education and the business world regarding the double-coordination of internships. It also occurs between the public agency for innovation and businesses (especially small ones), who fear the likelihood of having to support higher costs, such as in infrastructure, for example, which they are likely to have to share with the competition, or which they consider to be irrelevant. These examples show us, once again, the importance of the institutions involved, and especially their capacity to disseminate and demonstrate the potential of knowledge sharing. In contrast, the "triple helix" has been working well in Portugal, resulting in an increasing number of best practices in the relations between Government - Universities - Companies.

Another problem that has come about concerns the frequent loss of consistency in public decisions when they are rolled out to regional, or more decentralized decision-making levels, making it especially impossible to transmit the key elements of the broader goals and national targets to micro-units.

In other words, what is lacking is the design and implementation of a knowledge strategy, which by replacing and adding to the wider public policy and decisions, enables consistency, internal coherence, and the sustainability of the knowledge process in Portugal.

However, the new Government seems intent on establishing significant progress regarding the establishment of this strategy. The current minister for Science, Technology and Higher Education, in sharing the same understanding as that characterised by Mariano Gago, namely that knowledge is a service for society as a whole, has made a mark by implementing important innovative measures, even though he has only been in office for barely six months. Among these measures, we highlight the following:

- The establishment of partnerships with other Ministries - Education, Economy, Labour and Social Welfare, Finance, Economy, for decision making and the joint coordination of programmes implemented in the meanwhile. Of these, one needs to highlight the initiatives for the dissemination and cross-fertilization of knowledge for the communal ownership of the results of knowledge in various regions, and by various institutional networks, and for the compulsory open consultation and public accountability of the knowledge process supported by public funding, amongst others.

- The regular public disclosure of the most significant results of the development of knowledge in dynamic and participatory open forums, which are pedagogically prepared, and at symposiums and university conferences, but mainly in communal spaces. It is here that the major national targets have started to be discussed, whose development will be brought about by knowledge.

- The strengthening and development of scientific and international innovation partnerships, with emphasis on universities of reference and global leading institutions, such as the OECD.

- The intensification and improvement of the methodologies and procedures of the certification and accreditation processes of Portuguese universities and research centres, in conjunction with internationally-recognised bodies.

- Furthermore, and certainly the most important step: the review of the process and operational results of the FCT, the Portuguese agency for Science and Technology, under the coordination of the new management, which has now been nominated, and the redefinition of evaluation methodologies and the current conditions for financing in place for national research units, in an attempt to eradicate previously errors.

It seems, therefore, that we may be able to anticipate with relative optimism the evolution of the future dynamics of knowledge in Portugal, now that the general guidelines for a knowledge strategy are now being established and delimited.

5. Conclusion

The cumulative effects exerted by the economic crisis and Government alternation led to a new phase of setback in the process of knowledge development in Portugal. Although the country is scoring better in some indicators than their Southern Europe counterparts, namely in what has to do with gross domestic expenditure on R&D, according to OECD data, in most knowledge fields Portugal is still scoring under both OECD and EU 28 average.
When investigating the reasons behind that backlash we find that knowledge institutions have deeply suffered from funding restrictions associated with a new dominant ideology. This led to the subordination to the priority given to the control of the deficit in public accounts of many public policies, as it was the case with R&D, education and innovation. As a result, the latter were then conceived as a cost instead of an indispensable investment for the progress of knowledge. Accordingly, public institutions – as FCT, the Portuguese State agency for Science and Technology – prevented the development of important R&D projects and research centers, namely in the fields of Human and Social Sciences, led to an artificial hierarchy among scientific domains and, most of all, blocked most spillover effects which were already developing. The Portuguese knowledge system was risking disintegration. The sole positive exception occurred partially with the “Triple Helix – University – Government – (Large) Business”, in the words of Etzkowitz & Leydesdorff.

Science, R&D and the knowledge process were then taken apart from society until the newly elected Government came into force in October 2015. In these few months the minister for Science, Technology and Higher Education and its cabinet strongly committed to revert the previous trend and reinstall the democratic conception of knowledge as a social service. Recent public policies are being launched which profoundly renew the mission and performance of public institutions working into/for the Portuguese knowledge system. And the guidelines for a true strategy for knowledge development are obtaining the necessary consensus with other cabinets as the Economy, Treasure and Education ones. Therefore, we are now anticipating more optimistically the progress in the Portuguese knowledge system in the close future.

6. References

1. Apple, Michael 2014. *Official Knowledge: Democratic Education in a Conservative Age* (3rd. Revised edition). N. Y: Routledge.

2. Barro, Robert J. 1988. *Government spending in a simple model of endogenous growth*. NBER papers (http://www.nber.org/papers/w2588).

3. Chagas Lopes, Margarida. 2011. Education, Vocational Training and R&D: Towards New Forms of Labour Market Regulation. *Journal of Research in Educational Sciences,* vol. 0(1):16-31.

4. Chagas Lopes, Margarida. 2014. The Development of Knowledge in Portugal: a Slow and Unsustainable Progress. *The IUP Journal of Knowledge Management,* vol XII, nº 3: 42-60.

5. DGEEC. 2014. Principais Resultados do CIS 2012- Inquérito Comunitário à Inovação.

6. Etzkowitz, Henry and Leydesdorff, Loet. 1995. The Triple Helix -- University-Industry-Government Relations: A Laboratory for Knowledge Based Economic Development. *EASST Review*, vol. 14, nº1: 14-19 (file:///C:/Users/MARGARIDA/Downloads/SSRN-id2480085.pdf).

7. EU. 2015. *Innovation Union Scoreboard 2015*. http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards/files/ius-2015_en.pdf

8. EUROSTAT – DGEEC.2015.Community Innovation Survey (CIS).

9. FCT. 2016. *Projectos de I&D*. (https://www.fct.pt/apoios/projectos/estatisticas/).

10. Hanushek, Eric, A. and Woessmann, Ludger. 2012. Do better schools lead to more growth? Cognitive skills, economic outcomes and causation. *Journal of Economic Growth*, Vol 17, Issue 4:267-321.

11. Kovács, Illona and Chagas Lopes, Margarida. 2010. Employment and Sustainable Development: Education, Training and R&D in the Regulation of the Labour Market. MPRA paper 24931. Munich: University Library (https://mpra.ub.uni-muenchen.de/24931/1/MPRA_paper_24931.pdf).

12. Leydesdorff, Loet. 2013. The Triple Helix of University-Industry-Government Relations. *Encyclopedia of Creativity, Invention and Entrepreneurship*: 1844-1851.

13. OECD. 2015. *OECD Science, Technology and Industry. Scoreboard 2015*. (http://www.oecd.org/sti/oecd-science-technology-and-industry-scoreboard-20725345.htm).

14. PORDATA DATABASE. 2016. www.pordata.pt.

15. Romer, Paul M. 1994.The origins of endogenous growth. *The Journal of Economic Perspectives*, 8 (1): 3-22.